

## Introduction

In this section, the lessons focus on selecting, estimating, and converting units of measure for length, weight/mass, liquid volume, area, and temperature in the customary and metric systems. These lessons form an outline for your ARI classes, but you are expected to add other lessons as needed to address the concepts and practice the skills introduced in the ARI Curriculum Companion.

Some of the lessons cross grade levels, as indicated by the SOL numbers shown below. This is one method to help students connect the content from grade to grade and to accelerate.

For the lessons in this section, you will need the materials listed at right.

### MATERIALS SUMMARY

Adding machine paper roll  
Cardstock  
Chips/counters  
Construction paper  
Counters  
Display clock  
Gallon, quart, pint, and cup containers  
Index cards  
Markers  
Rulers  
Scissors  
Stopwatch  
Tape  
Yarn or string licorice

## Standards of Learning

The following Standards of Learning are addressed in this section:

- 5.11 The student will choose an appropriate measuring device and unit of measure to solve problems involving measurement of
- length — part of an inch ( $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{1}{8}$ ), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers;
  - weight/mass — ounces, pounds, tons, grams, and kilograms;
  - liquid volume — cups, pints, quarts, gallons, milliliters, and liters;
  - area — square units; and
  - temperature — Celsius and Fahrenheit units.

Problems also will include estimating the conversion of Celsius and Fahrenheit units relative to familiar situations (water freezes at  $0^{\circ}\text{C}$  and  $32^{\circ}\text{F}$ , water boils at  $100^{\circ}\text{C}$  and  $212^{\circ}\text{F}$ , normal body temperature is about  $37^{\circ}\text{C}$  and  $98.6^{\circ}\text{F}$ ).

- 5.12 The student will determine an amount of elapsed time in hours and minutes within a 24-hour period.
- 6.9 The student will compare and convert units of measure for length, area, weight/mass, and volume within the U.S. Customary system and the metric system and estimate conversions between units in each system:
- length — part of an inch ( $\frac{1}{2}$ ,  $\frac{1}{4}$ , and  $\frac{1}{8}$ ), inches, feet, yards, miles, millimeters, centimeters, meters, and kilometers;
  - weight/mass — ounces, pounds, tons, grams, and kilograms;
  - liquid volume — cups, pints, quarts, gallons, milliliters, and liters; and
  - area — square units. \*

*\* The intent of this standard is for students to make ballpark comparisons and not to memorize conversion factors between U.S. Customary and metric units.*

- 6.10 The student will estimate and then determine length, weight/mass, area, and liquid volume/capacity, using standard and nonstandard units of measure.

## Table of Contents

The following lessons are included in this section. Click (or CTRL+click) on each to jump to that lesson.

* SOL 5.11, 6.10.....	2
* SOL 5.11a, 6.10.....	5
* SOL 5.11c, 6.9c.....	8
* SOL 5.11, 6.9.....	10
* SOL 5.12 (Part 1 of 2 lessons) .....	19
* SOL 5.12 (Part 2 of 2 lessons) .....	25

## \* SOL 5.11, 6.10

Prerequisite SOL

None

Lesson Summary

Students use an arbitrary length of yarn or string licorice as a nonstandard unit to measure a variety of items. (45 minutes)

Materials

“Terms for Measuring Length” graphic organizers

Yarn or string licorice

“Measurement in Nonstandard Units” worksheets

Scissors

Warm-up

Have students brainstorm a list of terms that relate to measuring length, using the attached “Terms for Measuring Length” graphic organizer. Discuss their responses as a class.

Lesson

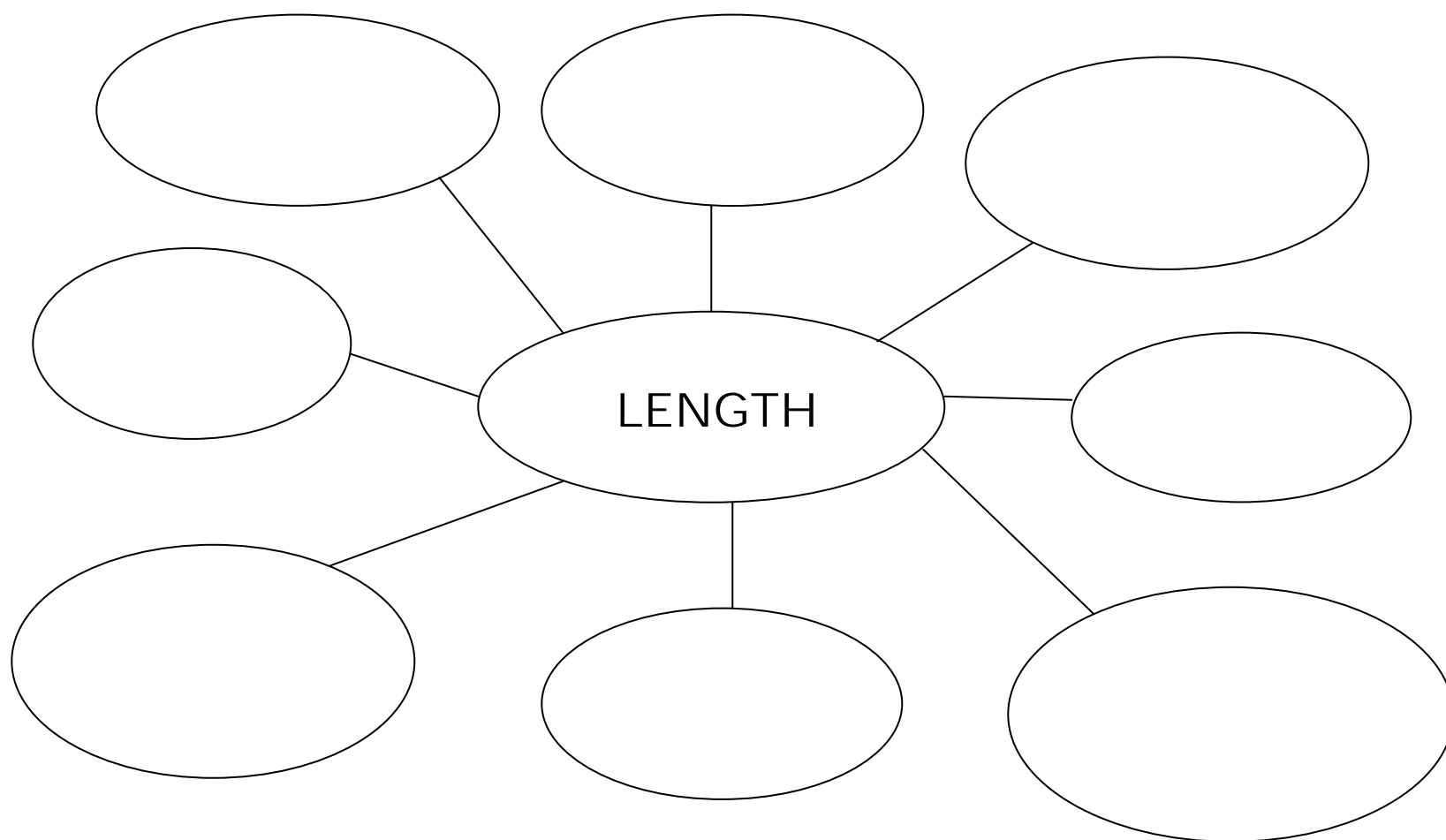
1. Have students draw pictures of what they are doing as they move through this process. Give each student four equal-length pieces of yarn or string licorice. Have students pick up one piece and note that the length of this piece represents the “whole” of “one” yarn or licorice. Record this information on a chart, and have students also record it.
2. Have students pick up a second piece, fold it in half, and cut it into the two resulting congruent pieces. Ask what these strips should be called. (“halves”) Ask how many halves are in one whole. (two) Check to see that students are recording the length in correct fraction format.
3. Have students pick up another piece, fold it in half twice, and cut it into the four resulting congruent pieces. Ask what these strips should be called. (“fourths”) Ask how many fourths are in one whole and how many are in one half. (four and two)
4. Have students pick up the last piece, fold it in half three times, and cut it into the eight resulting congruent pieces. Ask what these strips should be called. (“eighths”) Ask how many eighths are in one whole, how many are in one half, and how many are in one fourth. (eight, four, and two)
5. Have students use the licorice or yarn lengths as a nonstandard-unit tool for measurement, completing the “Measurement in Nonstandard Units” worksheet. Students will first estimate measurements and then make actual measurements, using the whole length first and then the fractional lengths as necessary.
6. Have students share their results, and discuss the process as a class.

Reflection

Have students answer the following questions in writing:

- What licorice or yarn pieces are the same as one-half? (each of the two halves)
- What do you notice about these lengths when they are written as fractions? (that  $\frac{2}{4}$  and  $\frac{4}{8}$  are the same as  $\frac{1}{2}$ , and that the denominator of each fraction is 2 times the numerator)
- Why do we not take measurements in licorice or yarn units? (Licorice or yarn units are not standard tools and do not indicate a standard unit of measure.)

## Terms for Measuring Length



## Measurement in Nonstandard Units

Estimate the length of each item in licorice or yarn lengths. Then, measure the items, using your licorice or yarn lengths. When measuring, first determine how many whole lengths are needed, and then use partial lengths to measure fractional lengths.

Item	Estimated Measure	Actual Measure
1. Desk		
2. Piece of notebook paper		
3. Math book		
4. Glue stick		
5. Pencil		
6. Marker		
7. Your shoe		
8. Computer monitor		
9. Chalkboard		
10. Paper clip		

## \* SOL 5.11a, 6.10

### Prerequisite SOL

None

### Lesson Summary

Students create rulers to measure items in the classroom to the nearest  $\frac{1}{2}$ ,  $\frac{1}{4}$ , or  $\frac{1}{8}$  of an inch. This lesson can also be adapted for measuring in centimeters. (Two 45-minute class periods)

### Materials

Inch rulers (or centimeter rulers, depending on the focus of the lesson)

12-inch strips of cardstock

“Measurement in Inches” worksheets (or “Measurement in Centimeters” worksheets, depending on the focus of the lesson)

### Warm-up

Have students use their feet, hands, and fingers as nonstandard units of measure to measure various items in the classroom (e.g., desks, chalkboard, textbook, width/length of room). Decide the items to be measured ahead of time, and have all students measure the same items. Also, measure the items yourself, using your feet, hands, and fingers. Have students record their measurements and then share and discuss the measurements. Which measurements were the same or almost the same? Which were noticeably different? What would account for the differences? Students should reach the conclusion that a standard tool for measuring a standard unit is needed because everyone's body parts are not the same length.

### Lesson

1. Give each student an inch ruler and a 12-inch strip of cardstock. Have students share what they already know about the ruler (reading it, measuring with it, etc.). Review the main parts of the ruler, pointing out that a ruler is read from left to right starting at the edge with the zero point. Note the different marker line lengths and what they represent (inches,  $\frac{1}{2}$  inches,  $\frac{1}{4}$  inches,  $\frac{1}{8}$  inches).
2. Have students create their own rulers on cardstock, using the real ruler to make measurements for the marks. Start by having them measure and mark with a long marker line the 1-inch increments from the left to the right end.
3. Ask students what measurements would come next. ( $\frac{1}{2}$  inches) Have students measure and mark with a shorter marker line the  $\frac{1}{2}$ -inch increments.
4. Continue this process for  $\frac{1}{4}$ -inch and  $\frac{1}{8}$ -inch increments, being sure to review the relationships among the fractions. Also, be sure students are labeling everything correctly on their rulers.
5. Once the rulers are completed, have students draw on a piece of paper, without using the ruler, five lines of various lengths. Then, have them measure their lines to the nearest  $\frac{1}{2}$ ,  $\frac{1}{4}$ , or  $\frac{1}{8}$  of an inch and write the answers on a separate piece of paper. Be sure they draw a variety of lengths that include fractions of an inch, not just whole inches. Have students exchange their five lines with a partner, and have the partners use their rulers to measure the lines to see if they agree on the measurements. Assist students as needed.
6. Have students estimate the lengths of the items listed on the “Measurement in Inches” worksheet (or estimate the lengths in centimeters, using the “Measurement in Centimeters” worksheet).
7. Have students make actual measurements of the items, using the rulers they made. Discuss the students' measurements.

### Reflection

Have students describe in writing, using words and/or pictures, how to measure an item with a ruler.

## Measurement in Inches

Estimate the lengths of the items in inches. Then, measure the items, using your inch ruler. When measuring, first determine how many whole inches are needed, and then use partial inches to measure fractional lengths.

<b>Item</b>	<b>Estimated Measure (in.)</b>	<b>Actual Measure (in.)</b>
1. Desk		
2. Piece of notebook paper		
3. Math book		
4. Glue stick		
5. Pencil		
6. Marker		
7. Your shoe		
8. Computer monitor		
9. Chalkboard		
10. Paper clip		

## Measurement in Centimeters

Estimate the lengths of the items in centimeters. Then, measure the items, using your centimeter ruler. When measuring, first determine how many whole centimeters are needed, and then use partial centimeters to measure fractional lengths.

<b>Item</b>	<b>Estimated Measure (cm)</b>	<b>Actual Measure (cm)</b>
1. Desk		
2. Piece of notebook paper		
3. Math book		
4. Glue stick		
5. Pencil		
6. Marker		
7. Your shoe		
8. Computer monitor		
9. Chalkboard		
10. Paper clip		

## \* SOL 5.11c, 6.9c

Prerequisite SOL

None

Lesson Summary

Students create a “gallon person” to reinforce the relationships among customary units of measure of liquid volume. (45 minutes)

Materials

Gallon, quart, pint, and cup containers	Scissors
Construction paper in 6 different colors	Markers
Tape	

Vocabulary

**capacity.** A measure of the amount of space that a liquid or dry ingredient occupies.

Warm-up

Have students brainstorm the names of the customary units (gallon, quart, pint, cup) used to measure liquid volumes. Write the terms on the board as the students generate them. Ask them to put the terms in order from greatest to least capacity and to represent any equivalent relationships between them. Display containers representing these four units of measure.

Lesson

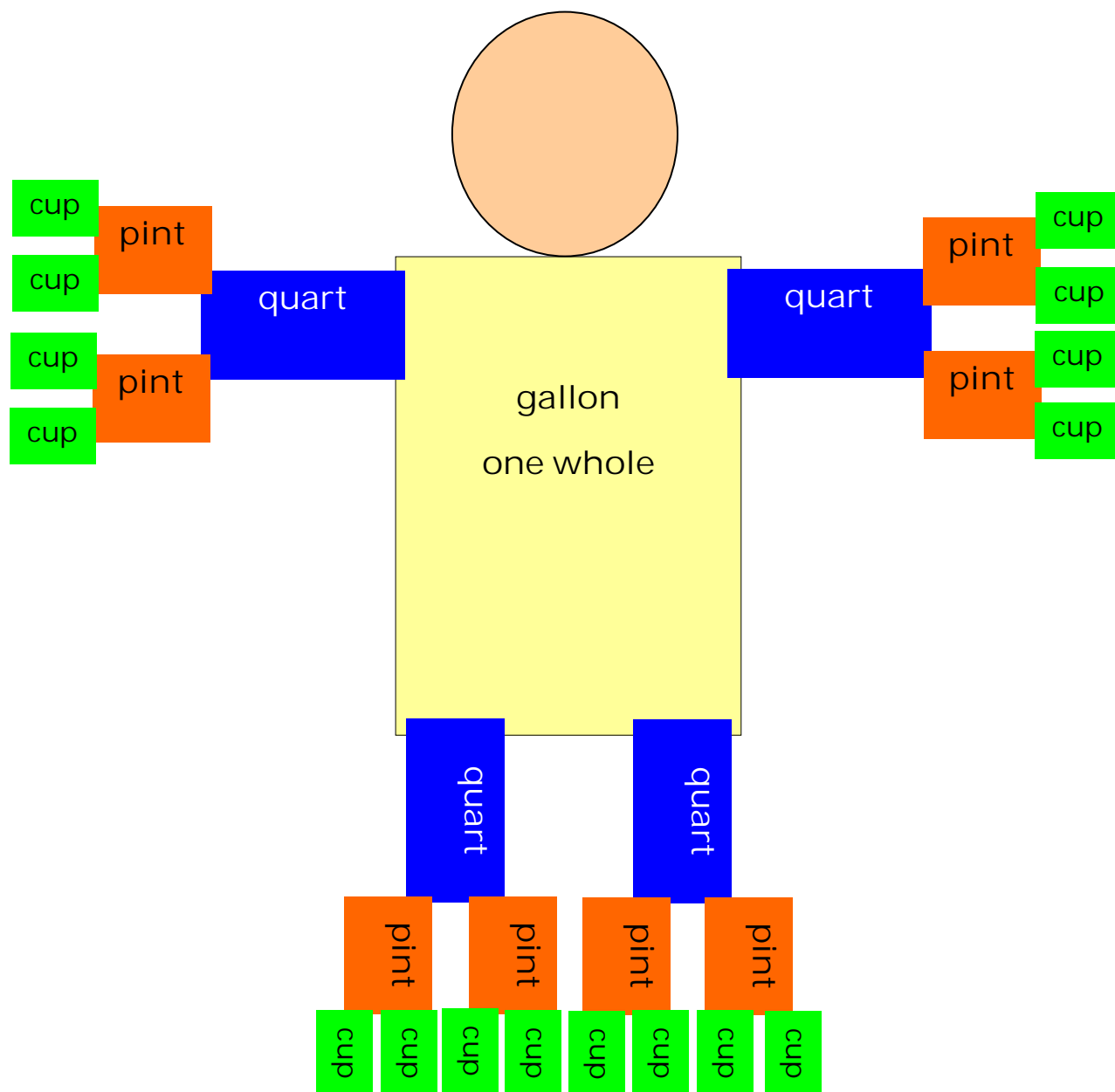
1. To help the students recall the relationships among the units of measure of liquid volume, have each student construct a “gallon person” (see attached diagram). As they are creating the different pieces of the gallon person, review the fractional relationships of each piece, and have the students label them. Begin by giving each student a sheet of construction paper in one color to represent a gallon. Have students label it with the words *gallon* and *one whole*.
2. Have each student divide a sheet of different-colored construction paper into fourths, cut out the 4 pieces, and use them to make the two upper arms and two upper legs by taping them to the gallon. Have the students label these four pieces with the word *quart*. Ask: “How many quarts are in a gallon?”
3. Have each student divide a third sheet of different-colored construction paper into eighths, cut out the eight pieces, and use them to make the two lower arms and two lower legs on *each* arm and leg by taping them to the upper arms and legs. Have them label these eight pieces with the word *pint*. Ask: “How many pints are in a quart? How many pints are in a gallon?”
4. Have each student divide a fourth sheet of different-colored construction paper into sixteenths, cut out the 16 pieces, and use them to make four fingers on each arm and four toes on each leg by gluing two of them to each lower arm and leg. Have them label these 16 pieces with the word *cup*. Ask: “How many cups are in a pint? How many cups are in a quart? How many cups are in a gallon?”
5. Finally, have the students use sheets of the two remaining colors of construction paper to complete their gallon person by making a head, hair, nose, eyes, ears, mouth, and other features.

Reflection

Have students complete multiple prompts in the following format: “I know that there are \_\_\_\_ quarts in a gallon because \_\_\_\_\_.”



# Gallon Person



## \* SOL 5.11, 6.9

Prerequisite SOL

None

Lesson Summary

Students play BINGO to reinforce measurement skills. (45 minutes)

Materials

Attached BINGO cards

Chips/counters to use as markers

Stopwatch

Warm-up

Group students into pairs, and have each pair list the customary units of measure used for length, weight/mass, liquid volume, area, and temperature. Allow each pair to present their list, and have them add any unit(s) they may have missed.

Lesson

1. This game is effective as a closing activity for a lesson on measurement. Determine which skill you wish the students to practice, and select the appropriate BINGO card for reinforcing (1) customary measurement, (2) metric measurement, (3) ballpark comparisons, or (4) conversions between customary and metric units.
2. Give students the BINGO cards and chips/counters to use as markers.
3. Call out a measurement from the answer-key card. Students must determine where the answer fits correctly and cover that square with a marker within a predetermined, limited period of time. When time is up, call time, and have all students put down their markers. Announce the correct answer. If students did not cover the correct answer *before* you read it aloud, they may not mark it afterwards. If students covered a square incorrectly, they must remove their marker from that square.
4. Repeat step 3 until a student(s) covers an entire row or column, yells BINGO, and wins the game.

Reflection

Have students create their own BINGO cards for customary or metric measurement, based on the attached cards.

Name: \_\_\_\_\_

## Customary Measurement BINGO

length of a new pencil	length of a person's arm	weight/mass of a newborn baby	temperature of freezing water	weight of an elephant
distance from Virginia to California	liquid volume of a large container of milk	temperature of boiling water	length of a paper clip	weight of a large dog
liquid volume of a serving of soda	normal body temperature	liquid volume of a large bucket	weight/mass of a nickel	liquid volume of a small carton of milk
volume of a container of ice cream	length of a football field	measurement of new carpet needed for your room	temperature of the classroom	liquid volume of a bathtub

Name: ANSWER KEY

## Customary Measurement BINGO

length of a new pencil 7½ inches	length of a person's arm 2 feet	weight/mass of a newborn baby 8 pounds	temperature of freezing water 32°F	weight of an elephant 1 ton
distance from Virginia to California 3,000 miles	liquid volume of a large container of milk 1 gallon	temperature of boiling water 212°F	length of a paper clip 1 inch	weight of a large dog 80 pounds
liquid volume of a serving of soda 1 cup	normal body temperature 98.6°F	liquid volume of a large bucket 5 gallons	weight/mass of a nickel 5 ounces	liquid volume of a small carton of milk 1 pint
volume of a container of ice cream 1 quart	length of a football field 100 yards	measurement of new carpet needed for your room 120 square feet	temperature of the classroom 72°F	liquid volume of a bathtub 30 gallons

Name: \_\_\_\_\_

## Metric Measurement BINGO

length of a new pencil	length of a van	weight/mass of a newborn baby	temperature of freezing water	weight/mass of an elephant
height of the room	liquid volume of a large container of soda	temperature of boiling water	thickness of a dime	weight/mass of a grain of salt
liquid volume of a small cup of coffee	normal body temperature	liquid volume of a car's gas tank	weight/mass of a nickel	length of a baseball bat
weight/mass of a paperclip	length of a walking race	weight/mass of a 12 year old	temperature of the classroom	liquid volume of a bathtub

Name: ANSWER KEY

## Metric Measurement BINGO

length of a new pencil 19 cm	length of a van 5 meters	weight/mass of a newborn baby 4 kilograms	temperature of freezing water 0°C	weight/mass of an elephant 2,300 kilograms
height of the room 3 meters	liquid volume of a large container of soda 2 liters	temperature of boiling water 100°C	thickness of a dime 1 mm	weight/mass of a grain of salt 5 mg
liquid volume of a small cup of coffee 150 mL	normal body temperature 37°C	liquid volume of a car's gas tank 50 liters	weight/mass of a nickel 5 grams	length of a baseball bat 1 meter
weight/mass of a paperclip 1 gram	length of a walking race 5 km	weight/mass of a 12 year old 40 kg	temperature of the classroom 25°C	liquid volume of a bathtub 70 liters

Name: \_\_\_\_\_

## Ballpark Comparison BINGO

One inch is about ____ centimeters.	One ounce is about _____ grams.	One quart is a little less than 1 _____.	_____ temperature is about 25°C and 72°F.
_____ temperature is about 37°C and 98°F.	One foot is about ____ centimeters.	One meter is about _____ inches.	Water _____ at 0°C and 32°F.
A kilogram is a little more than _____ pounds.	One mile is slightly longer than 1.5 _____.	A nickel has a mass of about _____ grams.	One meter is a little _____ than 1 yard.
One liter is a little more than 1 _____.	Water _____ at 100°C and 212°F.	A gram is less than an _____.	One kilometer is slightly longer than half a _____.

Name: ANSWER KEY

## Ballpark Comparison BINGO

<p>One inch is about ____ centimeters.</p> <p>2.5</p>	<p>One ounce is about ____ grams.</p> <p>28</p>	<p>One quart is a little less than 1 ____.</p> <p>liter</p>	<p>____ temperature is about 25°C and 72°F.</p> <p>Room</p>
<p>____ temperature is about 37°C and 98°F.</p> <p>Body</p>	<p>One foot is about ____ centimeters.</p> <p>30</p>	<p>One meter is about ____ inches.</p> <p>40</p>	<p>Water ____ at 0°C and 32°F.</p> <p>freezes</p>
<p>A kilogram is a little more than ____ pounds.</p> <p>2</p>	<p>One mile is slightly longer than 1.5 ____.</p> <p>kilometers</p>	<p>A nickel has a mass of about ____ grams.</p> <p>5</p>	<p>One meter is a little ____ than 1 yard.</p> <p>longer</p>
<p>One liter is a little more than 1 ____.</p> <p>quart</p>	<p>Water ____ at 100°C and 212°F.</p> <p>boils</p>	<p>A gram is less than an ____.</p> <p>ounce</p>	<p>One kilometer is slightly longer than half a ____.</p> <p>mile</p>



Name: \_\_\_\_\_

## Conversion BINGO

8 quarts = _____ gallons	2 pounds = _____ ounces	2.75 meters = _____ centimeters	250 mL = _____ liters	6.5 grams = _____ milligrams
133 milligrams = _____ grams	2 feet = _____ inches	3 quarts = _____ pints	1 ton = _____ pounds	88 meters = _____ kilometers
160 ounces = _____ pounds	1 quart = _____ cups	5,000 meters = _____ kilometers	1 mile = _____ feet	1 mile = _____ yards
8.3 meters = _____ centimeters	8.5 liters = _____ milliliters	6 kilograms = _____ grams	21 feet = _____ yards	15 yards = _____ feet

Name: ANSWER KEY

## Conversion BINGO

8 quarts = ____ gallons  2	2 pounds = ____ ounces  32	2.75 meters = ____ centimeters  275	250 mL = ____ liters  0.250	6.5 grams = ____ milligrams  6,500
133 milligrams = ____ grams  0.133	2 feet = ____ inches  24	3 quarts = ____ pints  6	1 ton = ____ pounds  2,000	88 meters = ____ kilometers  .088
160 ounces = ____ pounds  10	1 quart = ____ cups  4	5,000 meters = ____ kilometers  5	1 mile = ____ feet  5,280	1 mile = ____ yards  1,760
8.3 meters = ____ centimeters  830	8.5 liters = ____ milliliters  8,500	6 kilograms = ____ grams  6,000	21 feet = ____ yards  7	15 yards = ____ feet  45

## \* SOL 5.12 (Part 1 of 2 lessons)

Prerequisite SOL

None

Lesson Summary

Students determine elapsed time at 15-min., 30-min., 45-min., and 1-hour intervals, using a time number line. (45 minutes)

Materials

“Elapsed Time Warm-up” worksheets

Clock

Adding machine tape

Inch rulers

Markers

“Elapsed Time Number Line” worksheets

One set of “I Have...” Game Cards

Vocabulary

**elapsed time.** The difference between a beginning time and an ending time.

Warm-up

Have students answer the questions on the warm-up worksheet. You will need to display three different times on clock faces on the board or overhead.

Lesson

1. Ask students to figure out how much time has passed from the time they arrived at school until Algebra Readiness class began. Ask them to explain how they figured this out. Use a clock to show how much time has passed. Discuss what “elapsed time” means.
2. Have students create a time number line, using adding machine tape. Create your own time number line as you give the directions. Put a large mark at the left end of the tape to indicate 12 midnight, and label it “12 midnight” Measure 4 inches from this mark, making a small mark for each inch in between, and make and label another large mark to indicate 1:00 a.m. Measure another 4 inches, making a small mark for each inch in between, and make and label another large mark for 2:00 a.m. Continue this process until 12 noon. Finally, label the small marks between hour marks with 15-min. increments (12:15, 12:30, 12:45).
3. Discuss the time intervals as students are creating their time number line.
4. Review how to add minutes and hours. Give examples of how to determine elapsed time between events, using this time-number-line tool.
5. Have students complete the “Elapsed Time Number Line” worksheet.
6. Have students play the “I Have...” game. Directions: Cut the cards out, and randomly give them to students. Students may receive more than one card. The student who has the 9:00 a.m. card starts the game by reading the card. The student who has the 9:15 card then reads his/her card, and the game continues through all 26 cards. The last card will take them back to 9:00 a.m. Redistribute the cards, and play again.

Reflection

Have students create five “I Have...” cards of their own, using 15-min., 30-min., 45-min., and 1-hour intervals. You could use these as warm-ups for future classes.

Name: \_\_\_\_\_

## Elapsed Time Warm-up

1. How many minutes are in an hour? \_\_\_\_\_
2. How many minutes are in a half hour? \_\_\_\_\_
3. What times are shown on the three clock faces that are displayed?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
4. How many hours and minutes are in 92 minutes? \_\_\_\_\_

Name: ANSWER KEY

## Elapsed Time Warm-up

1. How many minutes are in an hour? 60
2. How many minutes are in a half hour? 30
3. What times are shown on the three clock faces that are displayed? (Answers will vary depending on the times selected.)
4. How many hours and minutes are in 92 minutes? 1 hour, 32 minutes

Name: \_\_\_\_\_

## Elapsed Time Number Line

Use your time number line to find the elapsed time.

1. Start time: 8:00 a.m. End time: 10:30 a.m.

Elapsed time: \_\_\_\_\_

2. Start time: 12:45 p.m. End time: 2:30 p.m.

Elapsed time: \_\_\_\_\_

3. Start time: 9:15 a.m. End time: 12:30 p.m.

Elapsed time: \_\_\_\_\_

4. Start time: 11:00 p.m. End time: 2:15 a.m.

Elapsed time: \_\_\_\_\_

5. Start time: 7:45 p.m. End time: 10:15 p.m.

Elapsed time: \_\_\_\_\_

Name: ANSWER KEY

## Elapsed Time Number Line

Use your time number line to find the elapsed time.

1. Start time: 8:00 a.m. End time: 10:30 a.m.

Elapsed time: 2 hours, 30 minutes

2. Start time: 12:45 p.m. End time: 2:30 p.m.

Elapsed time: 1 hour, 45 minutes

3. Start time: 9:15 a.m. End time: 12:30 p.m.

Elapsed time: 3 hours, 15 minutes

4. Start time: 11:00 p.m. End time: 2:15 a.m.

Elapsed time: 3 hours, 15 minutes

5. Start time: 7:45 p.m. End time: 10:15 p.m.

Elapsed time: 2 hours, 30 minutes

## "I Have..." Game Cards

<i>(start card)</i> <b>I have 9:00 a.m.</b> Who has 15 minutes later?	<b>I have 9:15 a.m.</b> Who has 1 hour later?	<b>I have 10:15 a.m.</b> Who has noon?
<b>I have noon.</b> Who has ½ hour later?	<b>I have 12:30 p.m.</b> Who has 1 hour and 15 minutes later?	<b>I have 1:45 p.m.</b> Who has 30 minutes later?
<b>I have 2:15 p.m.</b> Who has a quarter of an hour later?	<b>I have 2:30 p.m.</b> Who has a quarter 'til 3:00 p.m.?	<b>I have 2:45 p.m.</b> Who has 30 minutes later?
<b>I have 3:15 p.m.</b> Who has 1 hour and 45 minutes later?	<b>I have 5:00 p.m.</b> Who has 1 hour earlier?	<b>I have 4:00 p.m.</b> Who has 1½ hours later?
<b>I have 5:30 p.m.</b> Who has 2 hours and 15 minutes later?	<b>I have 7:45 p.m.</b> Who has 30 minutes later?	<b>I have 8:15 p.m.</b> Who has 2 hours later?
<b>I have 10:15 p.m.</b> Who has half past 11 p.m.?	<b>I have 11:30 p.m.</b> Who has midnight?	<b>I have 12 midnight</b> Who has 1 hour earlier?
<b>I have 11:00 p.m.</b> Who has 2 hours later?	<b>I have 1:00 a.m.</b> Who has 2 hours and 15 minutes later?	<b>I have 3:15 a.m.</b> Who has a quarter of an hour earlier?
<b>I have 3:00 a.m.</b> Who has 2 hours and 15 minutes later?	<b>I have 5:15 a.m.</b> Who has 30 minutes earlier?	<b>I have 4:45 a.m.</b> Who has 60 minutes later?
<b>I have 5:45 a.m.</b> Who has 15 minutes later?	<b>I have 6:00 a.m.</b> Who has 3 hours later?	



## \* SOL 5.12 (Part 2 of 2 lessons)

Prerequisite SOL

None

Lesson Summary

Students determine an amount of elapsed time in hours and minutes within a 24-hour period.  
(45 minutes)

Materials

"Elapsed Time Warm-up" worksheets	"Elapsed Time Practice" worksheets
Clock	Index cards

Vocabulary

**elapsed time.** The difference between a beginning time and an ending time.

Warm-up

Have students fill in the chart on the warm-up worksheet. Allow them to use the time number line they created in part one of this lesson, if they wish.

Lesson

1. Discuss the warm-up worksheet, and have students share how they arrived at their answers.
2. Review part one of this lesson, discussing elapsed time at 15-min., 30-min., 45-min., and 1-hour intervals.
3. Have students move the hands of a clock to show how much time passes from start to finish of the school day. Discuss first counting hour by hour, then moving in 15-min., 5-min., or 1-min. intervals to calculate elapsed time.
4. On the board or overhead, draw a chart showing Start Time, End Time, Hours Passed, Extra Minutes Passed, and Elapsed Time (similar to the chart on the "Elapsed Time Practice" worksheet). Under Start Time, write the time the algebra readiness lesson started. Ask students what time it is now, and fill in their response under End Time. Ask students how much time has elapsed so far. Use the clock to show the change from start time to end time.
5. Continue listing other daily school events in the chart (class times, lunch time, etc.) and having students list the start time and end time of each event and then calculate elapsed time.
6. Have students complete the "Elapsed Time Practice" worksheet.

Reflection

Have students invent an elapsed time word problem of their own and write it on an index card. Have them write the answer on another index card. Collect these cards to use later as a matching game for review.

Name: \_\_\_\_\_

## Elapsed Time Warm-up

Complete the following chart:

Activity	Start Time	End Time	Elapsed Time
Take piano lesson	9:30 a.m.		45 minutes
Attend soccer practice		6:00 p.m.	1 hour, 15 minutes
Do homework	3:45 p.m.	4:45 p.m.	
Watch television	7:30 p.m.		Half an hour
Sleep	9:00 p.m.	6:45 a.m.	

Name: ANSWER KEY

## Elapsed Time Warm-up

Complete the following chart:

Activity	Start Time	End Time	Elapsed Time
Take piano lesson	9:30 a.m.	<u>10:15 a.m.</u>	45 minutes
Attend soccer practice	<u>4:45 p.m.</u>	6:00 p.m.	1 hour, 15 minutes
Do homework	3:45 p.m.	4:45 p.m.	<u>1 hour</u>
Watch television	7:30 p.m.	<u>8:00 p.m.</u>	Half an hour
Sleep	9:00 p.m.	6:45 a.m.	<u>9 hours, 45 minutes</u>

Name: \_\_\_\_\_

## Elapsed Time Practice

On your mark, get set, go! Four runners started a marathon at 8:00 a.m. Use each runner's finish time to calculate how long it took him/her to complete the marathon.

Runner	Start Time	End Time	Hours Passed	Extra Minutes Passed	Elapsed Time
Jack	8:00 a.m.	11:14 a.m.			
Jill	8:00 a.m.	10:48 a.m.			
Lisa	8:00 a.m.	12:30 p.m.			
Bob	8:00 a.m.	12:27 p.m.			

- Who won the race? \_\_\_\_\_
- Which runners took more than 4 hours to complete the marathon? \_\_\_\_\_
- Cathy is making brownies. They need to bake for 47 minutes. She put them in the oven at 6:30 p.m. What time should she take them out?
  - 7:46 p.m.
  - 7:17 p.m.
  - 7:07 p.m.
  - 6:47 p.m.
- Mrs. Duncan set a timer at 9:15 a.m. to ring in 35 minutes for a practice quiz in her classroom. What time will it be when the timer rings?
  - 10:00 a.m.
  - 9:55 a.m.
  - 9:50 a.m.
  - 9:45 a.m.
- Bill left home at 4:42 p.m. and rode his bike to his friend's house. It took him 23 minutes. What time did he arrive?
  - 4:55 p.m.
  - 5:00 p.m.
  - 5:05 p.m.
  - 5:15 p.m.
- Dad began cutting grass on Saturday morning at 9:28 a.m. He finished the entire yard by 10:46 a.m. How long did it take him?
  - 18 minutes
  - 1 hour and 8 minutes
  - 1 hour and 18 minutes
  - 1 hour and 46 minutes

Name: ANSWER KEY

## Elapsed Time Practice

On your mark, get set, go! Four runners started a marathon at 8:00 a.m. Use each runner's finish time to calculate how long it took him/her to complete the marathon.

Runner	Start Time	End Time	Hours Passed	Extra Minutes Passed	Elapsed Time
Jack	8:00 a.m.	11:14 a.m.	<u>3</u>	<u>14</u>	<u>3 hours, 14 mins.</u>
Jill	8:00 a.m.	10:48 a.m.	<u>2</u>	<u>48</u>	<u>2 hours, 48 mins.</u>
Lisa	8:00 a.m.	12:30 p.m.	<u>4</u>	<u>30</u>	<u>4 hours, 30 mins.</u>
Bob	8:00 a.m.	12:27 p.m.	<u>4</u>	<u>27</u>	<u>4 hours, 27 mins.</u>

- Who won the race? Jill
- Which runners took more than 4 hours to complete the marathon? Lisa and Bob
- Cathy is making brownies. They need to bake for 47 minutes. She put them in the oven at 6:30 p.m. What time should she take them out?  
 A 7:46 p.m.  
B 7:17 p.m.  
 C 7:07 p.m.  
 D 6:47 p.m.
- Mrs. Duncan set a timer at 9:15 a.m. to ring in 35 minutes for a practice quiz in her classroom. What time will it be when the timer rings?  
 A 10:00 a.m.  
 B 9:55 a.m.  
C 9:50 a.m.  
 D 9:45 a.m.
- Bill left home at 4:42 p.m. and rode his bike to his friend's house. It took him 23 minutes. What time did he arrive?  
 A 4:55 p.m.  
 B 5:00 p.m.  
C 5:05 p.m.  
 D 5:15 p.m.
- Dad began cutting grass on Saturday morning at 9:28 a.m. He finished the entire yard by 10:46 a.m. How long did it take him?  
 A 18 minutes  
 B 1 hour and 8 minutes  
C 1 hour and 18 minutes  
 D 1 hour and 46 minutes